REMARKS

Claims 1, 3, 4, 6 and 7, all the claims pending in the application, are rejected. Claim 1 is amended.

Support for Amendments

The amendments to claim 1 are clearly supported by the description on page 6, line 5 to page 7, line 7 and page 9, lines 10-15 of the original specification.

Claim Rejections - 35 USC § 102

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Aratani (US 4,671,814). This rejection is traversed for at least the following reasons.

Amended Claim 1

The features of the present invention, as recited in amended claim 1 are as follows:

(1) At a ***first-stage process***, the chemically strengthening the glass substrate is performed by the use of only sodium ions by ion-exchanging lithium ions with the sodium ions so as to produce compression stress on a surface of the glass substrate and to produce tensile stress in a depth of the glass substrate.

(2) At a ***second-stage process***, the chemically strengthening the glass substrate is performed by the use of only potassium ions by ion-exchanging the sodium ions with the potassium ions so as to increase the compression stress of the surface of the glass substrate and to reduce the tensile stress of the depth of the glass substrate.

(3) The lithium ion has a first ion radius, the sodium ion has a second ion radius, and the potassium ion has a third ion radius. Thus, the second ion radius is greater than the first ion radius and the third ion radius is greater than the second ion radius.

(4) The magnetic disk has a diameter not greater than 65 mm (namely, 2.5 inch).

Practical Advantage of Product From The Two Stage Process

By use of this specific two-stage process, it is possible to manufacture a glass substrate for a magnetic disk, which is high in transverse strength and is protected from damage or breakage with time.

The two stage process, when applied to a magnetic disk having the recited small diameter, provides a product that is very desirable for a mobile HDD, as described at page 9, lines 10-15 of the instant specification.

Aratani

The Examiner cites Aratani for its teaching of "a method for strengthening a glass substrate having a thickness of about 1.0mm by chemical strengthening," particularly in Example 1 as described at column 8, Lines 39-53, with regard to the immersion of a disk in molten sodium nitrate, followed by immersion in a bath of molten potassium nitrate. The Examiner asserts that "Aratani disclosure clearly sets forth a two step process wherein a glass substrate is process with a first alkali ion of a first molten salt containing only sodium nitrate and followed with a subsequent treatment using a second alkali ion of a second molten salt containing potassium nitrate."

No Anticipation

Basic Patent Law provides with respect to rejections under Section 102 that "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

The standard for anticipation is not met, since Aratani fails to disclose or suggest the combination of above-features (1)-(4) of the present invention.

No Lithium Ions

Specifically, the glass substrate of Aratani does not contain lithium ions. Aratani merely discloses the chemically strengthening using the ion-exchanging due to potassium ions at the second stage.

No Chemical Strengthening Using Claimed Ion Exchange

Aratani does not teach the chemically strengthening using an ion-exchange involving the claimed sequence of lithium ions-sodium ions- potassium ions.

In the absence of this combination of elements and their exchange in the stated sequence, the resulting product is not the same and there can be no anticipation.

Moreover, there is no basis for considering the stated sequence and elements to be obvious in view of the teachings of Aratani.

Claim Rejections - 35 USC § 103

Claims 3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani (US 4,671,814) in view of Takahashi (US 6,119,483). This rejection is traversed for at least the following reasons.

First, claims 3 and 6 would be patentable over Aratani because of the dependence of these claims from patentable amended claim 1.

Second, as to claim 1, the Examiner admits that "Aratani is silent regarding the composition of the glass substrate as recited in Claim 3." The Examiner asserts that, despite the silence of Aratani with regard to "a particular lithium-aluminosilicate glass as recited in Applicants claimed invention, such compositions of glass have been expressly considered by the inventors for use in the Aratani disclosed process."

Third, the Examiner asserts that "Applicants recited glass composition would have been obvious in view of the Takahashi disclosed process," which teaches "immersion in molten sodium and potassium nitrate salts wherein said strengthened substrate may be employed for use as a magnetic disk substrate."

Aratani

Applicants respectfully submit that, with respect to amended claim 1, Aratani is deficient for the reasons already given. With respect to claims 3 and 6, the Examiner has noted additional reasons for Aratani failing to teach the claimed invention.

Takahashi

Applicants note the Examiner's assertion that Takahashi discloses a type of chemical strengthening using the ion-exchanging involving sodium ions- potassium ions.

No Teaching of Claimed Three-Element Exchange

Applicants respectfully submit that Takahashi does not teach the chemically strengthening using the ion-exchanging due to lithium ions-sodium ions- potassium ions.

No Motivation to Use Three Element Exchange

Takahashi has found the use of a two-element exchange to be suitable for a conventional magnetic disk substrate; however, there is no recognition that any advantage would be attained from a three-element exchange. Such exchange is important for the product environment recited in the claim.

Specifically, the chemically strengthening using the ion-exchanging due to lithium ions-sodium ions- potassium ions is particularly suitable for the mobile HDD, i.e., the magnetic disk having a diameter not greater than 65 mm. The reason is that it is possible to manufacture the glass substrate for the magnetic disk, which is high in transverse strength and is prevented from damage or breakage with time by the two-stage process according to the present invention, as mentioned above.

Since neither of Aratani or Takahashi teach or suggest the combination of features (1)-(4), the cited references fail to teach these features of the present invention. Accordingly, for the reasons given, the present invention is clearly patentable over the cited references.

Claims 4 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aratani (US 4,671,814) and Takahashi (US 6,119,483) and as applied above and in further view of Morehouse (US 5,379,171). This rejection is traversed for at least the following reasons.

Morehouse

The Examiner admits that "The prior art is silent regarding the use of glass sheets having a thickness in the range as recited in claims 4 and 7," and looks to Morehouse for that teaching. The Examiner states that "As evidenced by the Morehouse reference, the use of a glass substrate having a thickness of 0.445mm which is in the range of 0.2 to 0.9 mm [Claim 4], or alternately from 0.2 to 0.6mm thick [Claim 7], is known in the art of hard drive manufacture."

Morehouse does not remedy the deficiencies of Aratani and Takahashi, as already note. Thus, these claims would be patentable for the reasons already given for parent amended claim 1.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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